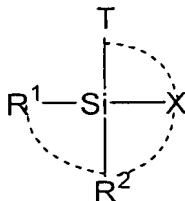


We claim:

*could be 1.*  
A method for generating a carbon-carbon bond between a transferable group and an acceptor group which comprises the steps of :

- a. reacting a organosilicon reagent of the formula:



where T is the transferable group that can be selected from an aromatic group, a substituted aromatic group, a heteroaromatic group, an olefinic group, a substituted olefinic group, an allylic group, a substituted allylic group, an acetylenic group, a substituted acetylenic group, an allenic group, a substituted allenic group, an alkyl group, and a substituted alkyl group;

X is selected from the group consisting of a hydrogen, an alkyl group, a substituted alkyl group, an olefinic group, a substituted olefinic group, an acetylenic group, a substituted acetylenic group, an aromatic group, a substituted aromatic group, a heteroaromatic group, a halide, OR or N(R)<sub>2</sub> groups, where R is hydrogen, an alkyl group or a substituted alkyl group, and a silane or siloxane group;

R<sup>1</sup> and R<sup>2</sup> are, independently, selected from the group consisting of alkyl or substituted alkyl groups, a silane group or a siloxane group; and where dashed lines indicate that any two of R<sup>1</sup>, R<sup>2</sup>, T or X can be covalently linked and R<sup>1</sup> and R<sup>2</sup> can be a transferable group T;

with an organic electrophile in the presence of a basic and nucleophilic activator anion and a Group 10 metal catalyst; and

b. recovering the desired cross-coupling product T-R<sup>3</sup> in which the -C-C- bond is formed.

2. The method of claim 1 wherein the organosilicon nucleophile is an alkenylsilacycloalkane.

5 3. The method of claim 1 wherein the organosilicon nucleophile is an aryl(fluoro)silacycloalkane or an aryl(chloro)silacycloalkane.

4. The method of claim 4 wherein the organosilicon nucleophile is an aryl(fluoro)silacyclobutane or an aryl(chloro)silacyclobutane.

10 5. The method of claim 1 wherein the organosilicon nucleophile is an aromatic or alkenylsilanol.

6. The method of claim 1 wherein the organosilicon nucleophile is a siloxane.

7. The method of claim 1 wherein the organosilicon nucleophile is a bis-silyl compound.

15 8. The method of claim 1 wherein the organic electrophile is a compound of formula R<sup>3</sup>Y, where Y is a leaving group and R<sup>3</sup> is the acceptor group which is selected from the group consisting of an aromatic group, a substituted aromatic group, a heteroaromatic group, an olefinic group, a substituted olefinic group, an allylic group, a substituted allylic group, an acetylenic group, a substituted acetylenic group, an allenic group, a substituted allenic group, an alkyl group, and a substituted alkyl group.

20 9. The method of claim 1 further comprising the step of combining the organosilicon nucleophile with the activator anion to activate the organosilicon nucleophile before it is reacted with the organic electrophile.

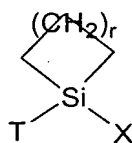
10. The method of claim 9 wherein the activator anion is present in molar equivalents in an amount ranging from about 2 to 3 times that of the organosilicon nucleophile.

11. The method of claim 8 wherein the acceptor is an alkenyl group or a substituted alkenyl group.

5 12. The method of claim 8 wherein the acceptor is an aromatic group or a substituted aromatic group.

13. The method of claim 8 wherein the acceptor is a heteroaromatic group.

14. The method of claim 1 wherein the organosilicon nucleophile has the formula:



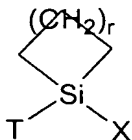
10 where r is 1-4 and X is, hydrogen, a halide, an alkyl group, a substituted alkyl group, or an OR group, where R is a hydrogen, an alkyl group or a substituted alkyl group.

15. The method of claim 14 wherein T is an alkenyl group or a substituted alkenyl group.

16. The method of claim 14 wherein T is an aromatic group, a substituted aromatic group or a heteroaromatic group.

15 17. The method of claim 14 where r is 1.

18. The method of claim 4 wherein the organosilicon nucleophile has the formula:

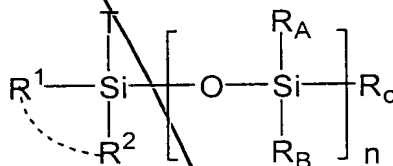


where r is 1-4 and X is a fluorine or chlorine.

19. The method of claim 18 wherein T is an aromatic group, a substituted aromatic group or a heteroaromatic group.

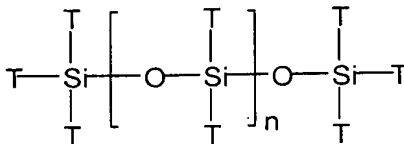
20. The method of claim 1 wherein T is an alkenyl, substituted alkenyl, aromatic group or substituted aromatic group and X is OH.

21. The method of claim 1 wherein the organosilicon nucleophile has the formula:



where n is an integer greater than or equal to 1; and  $\text{R}_A$ ,  $\text{R}_B$  and  $\text{R}_C$ , independently, are selected from the group consisting of an alkyl group, a substituted alkyl group, a halide, an OR or  $\text{NR}_2$  group, where each R independently of other R groups is a hydrogen, an alkyl group or a substituted alkyl group, or any of  $\text{R}_A$ ,  $\text{R}_B$  or  $\text{R}_C$  can be transferrable groups, and wherein any two of  $\text{R}_A$ ,  $\text{R}_B$  and  $\text{R}_C$  can be covalently linked.

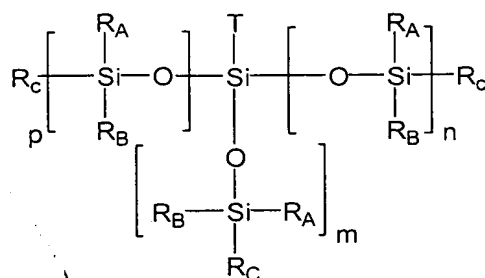
22. The method of claim 21 wherein the organosilicon nucleophile has the formula:



23. The method of claim 22 wherein T is an alkenyl, dienyl, allyl, or acetylenic group.

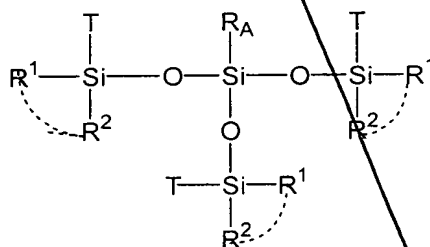
24. The method of claim 21 wherein n is 1-5, inclusive.

25. The method of claim 1 wherein the organosilicon nucleophile is:



wherein n, m and p are zero or integers that are greater than or equal to 1 and wherein at least one of n, m or p is 1 or greater; and R<sub>A</sub>, R<sub>B</sub> and R<sub>C</sub>, independently, are selected from the group consisting of an alkyl group, a substituted alkyl group, a halide, an OR or NR<sub>2</sub> group, where each R independently of other R groups is a hydrogen, an alkyl group or a substituted alkyl group, or any of R<sub>A</sub>, R<sub>B</sub> or R<sub>C</sub> can be transferrable groups, and wherein any two of R<sub>A</sub>, R<sub>B</sub> and R<sub>C</sub> can be covalently linked.

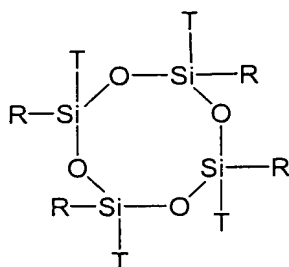
26. The method of claim 25 having the formula:



R<sub>A</sub> is selected from the group consisting of an alkyl group, a substituted alkyl group, a halide, an OR or NR<sub>2</sub> group, where each R independently of other R groups is a hydrogen, an alkyl group or a substituted alkyl group.

27. The method of claim 26 wherein one or more R<sup>1</sup> or R<sup>2</sup> groups are transferrable groups.



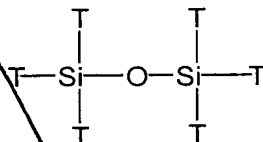


where R is an alkyl or substituted alkyl group and T is a transferable group.

34. The method of claim 33 wherein T is an olefin.

35. The method of claim 33 wherein T is a vinyl group.

36. The method of claim 28 wherein the organosilicon nucleophile has the formula:

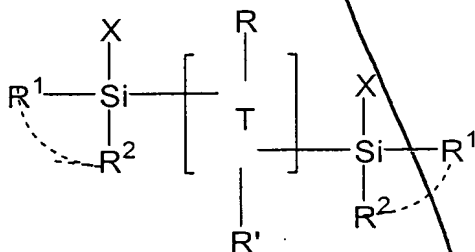


where R is an alkyl or substituted alkyl group and T is a transferable group.

37. The method of claim 36 wherein T is an olefin.

38. The method of claim 36 wherein T is a vinyl group.

39. The method of claim 1 wherein the organosilicon nucleophile has the formula:

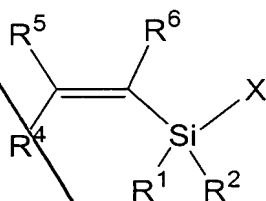


wherein R and R', independently, can be R<sup>1</sup>, R<sup>2</sup> or X groups.

40. The method of claim 39 wherein T is an olefin or a substituted olefin.
41. The method of claim 1 wherein the activator is a tetraalkylammonium fluoride, tetraalkylammonium hydroxide, or a tetraalkylammonium alkoxide.
42. The method of claim 1 wherein the activator is a tetrabutylammonium fluoride, tetrabutylammonium hydroxide, or a tetrabutylammonium alkoxide
43. The method of claim 1 wherein the palladium catalyst is selected from the group consisting of  $\text{Pd}(\text{dba})_2$ ;  $\text{Pd}(\text{dba})_3$ ;  $[\text{Pd}(\text{allyl})\text{Cl}]_2$ ;  $\text{PdCl}_2$ ;  $\text{Pd}(\text{OAc})_2$ ;  $\text{Pd}(\text{OTFA})_2$ ;  $(\text{COD})\text{PdBr}_2$ ;  $\text{Pd}(\text{OTf})_2$ ; and  $(\text{PhCN})_2\text{PdCl}_2$ .
44. The method of claim 1 wherein the palladium catalyst is  $\text{Pd}(\text{dba})_2$  or  $[\text{Pd}(\text{allyl})\text{Cl}]_2$ .
45. The method of claim 1 wherein the reaction is carried out in a polar aprotic solvent.
46. The method of claim 1 wherein the organosilicon nucleophile is activated prior to reaction with the organic electrophile.
47. The method of claim 1 wherein the reaction is carried out at ambient temperature.
48. The method of claim 1 wherein in T groups that contain  $-\text{CH}_2-$  groups one or more non-neighboring  $-\text{CH}_2-$  groups can be replaced with  $-\text{O}-$ ;  $-\text{S}-$ ;  $-\text{NH}-$ ;  $-\text{NH}-\text{CO}-$ ;  $-\text{NR}-$ , or  $-\text{NR}-\text{CO}-$ , where R is alkyl;  $-\text{C}=\text{O}$ ; or  $-\text{O}-\text{C}=\text{O}$ .
49. The method of claim 1 wherein the T group is substituted with one or more groups selected from a halide; and acyl group; an OR or  $\text{N}(\text{R})_2$  group, where R is a hydrogen, an alkyl or aryl group; an  $\text{SR}'$  group, where R' is an alkyl, aryl group, a substituted alkyl group, or a substituted aryl group.
50. The method of claim 1 wherein the organosilicon nucleophile is an alkenyl silanol.



51. The method of claim 50 wherein the activator anion is hydride.
52. The method of claim 50 wherein the activator anion is a trialkyl silanolate.
53. The method of claim 52 wherein the activator anion is trimethyl silanolate.
54. The method of claim 50 wherein the activator is fluoride-free.
55. The method of claim 54 wherein the method is carried out in DMF or DME.
56. The method of claim 1 wherein the organosilicon nucleophile has the formula:

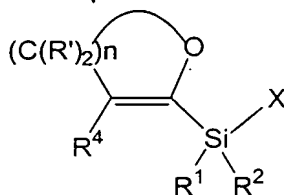


where X is a hydrogen or an OH or an OR group;

R<sup>1</sup> and R<sup>2</sup> are independently selected from the group consisting of alkyl or substituted alkyl groups wherein R<sup>1</sup> and R<sup>2</sup> may be covalently linked to each other;

R<sup>4-6</sup> are independently selected from H, alkyl, substituted alkyl, alkoxy, aryl or substituted aryl groups wherein any two of R<sup>1</sup>, R<sup>2</sup>, R<sup>4</sup>, R<sup>5</sup>, or R<sup>6</sup> may be covalently linked.

57. The method of claim 56 wherein the organonucleophile has the formula:

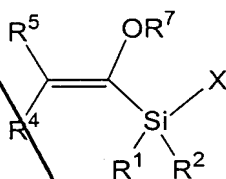


where X is a hydrogen or an OH or an OR group;

R<sup>1</sup> and R<sup>2</sup> are independently selected from the group consisting of alkyl or substituted alkyl groups wherein R<sup>1</sup> and R<sup>2</sup> may be covalently linked to each other;

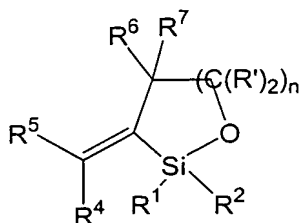
R<sup>4-5</sup> and R<sup>7</sup> are independently selected from H, alkyl, substituted alkyl, alkoxy, aryl or substituted aryl groups wherein any two of R<sup>1</sup>, R<sup>2</sup>, R<sup>4</sup>, R<sup>5</sup>, or R<sup>7</sup> may be covalently linked.

58. The method of claim 57 wherein the organosilicon nucleophile has the formula:



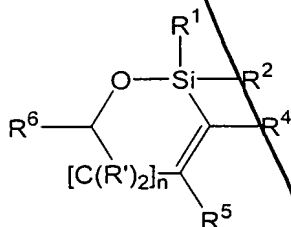
where n is 2-4.

59. The method of claim 56 wherein the organoelectrophile is an aryl halide or a substituted aryl halide.
60. The method of claim 56 wherein the organoelectrophile is an olefin or a substituted olefin.
61. The method of claim 56 wherein the organonucleophile has the formula:



where  $R^{1-2}$  can be alkyl or substituted alkyl,  $R^{4-7}$  can be H, alkyl, substituted alkyl, alkoxy, aryl or substituted aryl and  $R'$  independently can be H, an alkyl group or an aryl group, and  $n$  is 1-3.

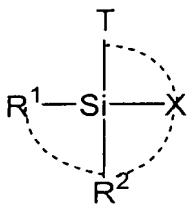
- 5
62. The method of claim 61 wherein the organoelectrophile is an aryl halide or substituted aryl halide.
63. The method of claim 62 wherein the organoelectrophile is an olefin or a substituted olefin.
64. The method of claim 61 further comprising the step of forming the organosilicon nucleophile by intramolecular hydrosilylation of a homopropargyl alcohol.
- 10 65. The method of claim 64 wherein the intramolecular hydrosilylation is catalyzed by a platinum catalyst.
66. The method of claim 65 wherein the catalyst is  $H_2PtCl_2$  or  $Pt(DVDS)$ .
67. The method of claim 64 wherein the intramolecular hydrosilylation and the cross-coupling reactions are performed in the same reaction vessel without purification of intermediates.
- 15 68. The method of claim 1 wherein the organosilicon nucleophile has the formula:



where n is 0, 1, 2, or 3, R<sup>1</sup> and R<sup>2</sup> independently are selected from alkyl or substituted alkyl groups, R<sup>4-6</sup> are selected from hydrogen, alkyl, substituted alkyl, alkoxy, aryl, substituted aryl, or heteroaromatic groups, and R' are independently selected from hydrogen, alkyl or substituted alkyl groups.

- 5 69. The method of claim 68 wherein n is 1 and R' are all hydrogens.
70. The method of claim 68 wherein the organosilicon nucleophile is formed by ring-closing metathesis.
71. The method of claim 70 wherein the ring-closing metathesis is catalyzed by a Mo catalyst.
- 10 72. A method for hydrocarbation of terminal alkynes to form a derivatized olefin which comprises the steps of :
- 15 (a) hydrosilylation of the terminal alkyne in the presence of a Pt catalyst;
- (b) reaction of the hydrosilylation product of step a with an organic electrophile in the presence of an basic and nucleophilic activator ion and a Group 10 metal catalyst;
- (c) recovery of the derivatized olefin product of hydrocarbation.
73. A method of claim 72 wherein the terminal alkyne is hydrosilylated with a dialkylchlorosilane in the presence of a Pt catalyst followed by *in situ* hydrolysis.
74. The method of claim 72 wherein the Pt catalyst is H<sub>2</sub>PtCl<sub>6</sub>.
- 20 75. The method of claim 72 wherein the organic electrophile comprises an aryl or olefinic group.

76. The method of claim 72 wherein the activator ion is  $F^-$ .
77. The method of claim 72 wherein the Group 10 metal catalyst is a Pd catalyst.
78. The method of claim 77 wherein the Pd catalyst is  $Pd(dba)_2$ .
79. The method of claim 72 wherein the terminal alkyne is hydrosilylated by reaction with a hydrodisiloxane.
80. The method of claim 73 wherein the Pt catalyst is  $H_2PtCl_6$ ,  $Pt(DVDS)$  complex or  $t-Bu_3P$ -modified  $Pt(DVDS)$  complex.
81. The method of claim 72 wherein the organic electrophile comprises an aryl group or an olefinic group.
82. The method of claim 72 wherein the activator ion is  $F^-$ .
83. The method of claim 72 wherein the Group 10 initial catalyst is a Pd catalyst.
84. The method of claim 83 wherein the Pd catalyst is  $Pd(dba)_2$ .
85. A reagent for formation of a  $-C-C-$  bond which comprises an organosilicon nucleophile of formula:



where T is the transferable group that can be selected from an aromatic group, a substituted aromatic group, a heteroaromatic group, an olefinic group, a

substituted olefinic group, an allylic group, a substituted allylic group, an acetylenic group, a substituted acetylenic group, an allenic group, a substituted allenic group, an alkyl group, and a substituted alkyl group;

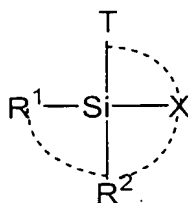
5 X is selected from the group consisting of a hydrogen, an alkyl group, a substituted alkyl group, an olefinic group, a substituted olefinic group, an acetylenic group, a substituted acetylenic group, an aromatic group, a substituted aromatic group, a heteroaromatic group, a halide, OR or N(R)<sub>2</sub> groups, where R is hydrogen, an alkyl group or a substituted alkyl group, and a silane or siloxane group;

10 R<sup>1</sup> and R<sup>2</sup> are, independently, selected from the group consisting of alkyl or substituted alkyl groups, a silane group or a siloxane group; and where dashed lines indicate that any two of R<sup>1</sup>, R<sup>2</sup>, T or X can be covalently linked.

15 86. The reagent of claim 85 for the cross-coupling of an olefin substrate and an aryl group wherein the T group in the organosilicon nucleophile is a an olefinic group, a substituted olefinic group, an allylic group, or a substituted allylic group.

87. The reagent of claim 85 for the cross-coupling of an aryl group with an olefin substrate wherein the T group of the organosilicon nucleophile is an aromatic group, a substituted aromatic group, or a heteroaromatic group.

20 88. A kit for performing a cross-coupling reaction which comprises one or more organosilicon nucleophiles of formula:



where T is the transferable group that can be selected from an aromatic group, a substituted aromatic group, a heteroaromatic group, an olefinic group, a substituted olefinic group, an allylic group, a substituted allylic group, an acetylenic group, a substituted acetylenic group, an allenic group, a substituted allenic group, an alkyl group, and a substituted alkyl group;

X is selected from the group consisting of a hydrogen, an alkyl group, a substituted alkyl group, an olefinic group, a substituted olefinic group, an acetylenic group, a substituted acetylenic group, an aromatic group, a substituted aromatic group, a heteroaromatic group, a halide, OR or N(R)<sub>2</sub> groups, where R is hydrogen, an alkyl group or a substituted alkyl group, and a silane or siloxane group;

R<sup>1</sup> and R<sup>2</sup> are, independently, selected from the group consisting of alkyl or substituted alkyl groups, a silane group or a siloxane group; and where dashed lines indicate that any two of R<sup>1</sup>, R<sup>2</sup>, T or X can be covalently linked.

89. The kit of claim 88 further comprising an activating anion.
90. The kit of claim 89 further comprising a Pd catalyst for the cross-coupling reaction.
91. The kit of claim 88 wherein the organosilicon reagent is a siloxane.
92. The kit of claim 91 wherein the organosilicon reagent is a cyclic siloxane.